Next Generation Architectures for Modeling and Simulation

S&T Campaign: Computational Sciences
Tier 2 Advanced Computing Architectures

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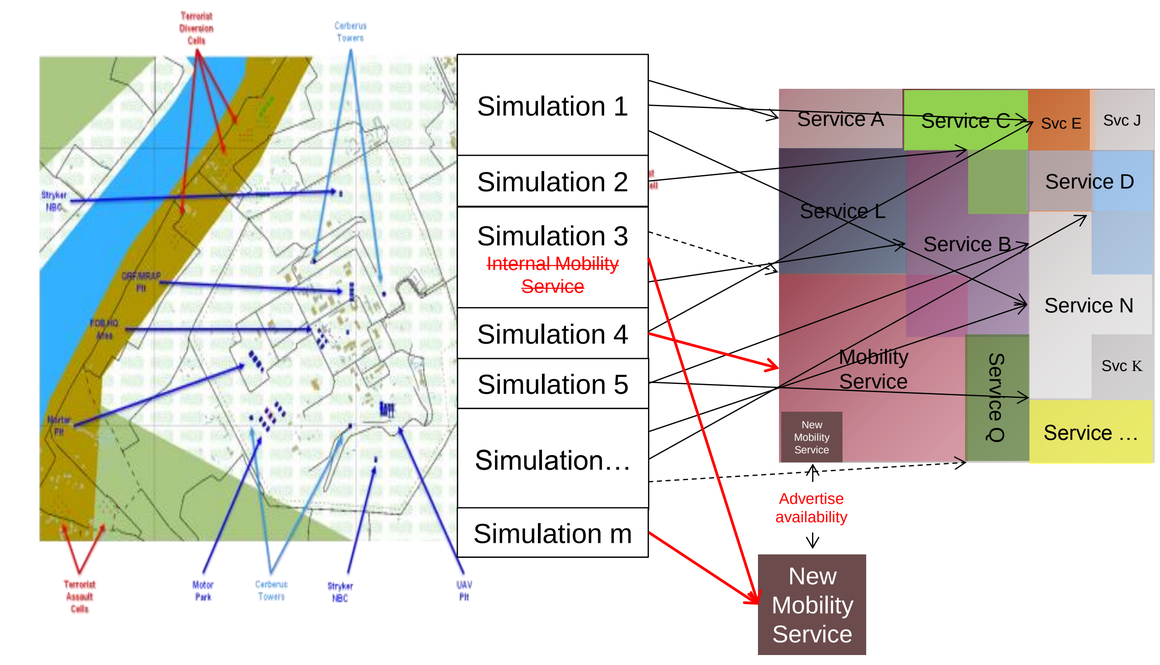
Research Objective

- **Refine and demonstrate advances in computer science that support the development of Modeling & Simulation (M&S) architectures required to support the M&S Communities (Acquisition, Test & Evaluation, Intelligence, Experimentation, Analysis and Training) in the future**
- **Research under this effort is a forward looking approach, working to identify concepts for investigation that will be used to accomplish Army M&S 3-5 years in the future**



Composable Models and Services Concept

ARL Facilities and Capabilities Available to Support Collaborative Research

- **ARL HPC infrastructure [need the right name(s)]**
- **Numerous legacy Army and Department of Defense simulations for use in demonstrating new computing concepts**
- **Access to models and unclassified empirical data for incorporation into new simulation architectures**
- **Geographically distributed networking infrastructure to demonstrate new computing concepts over long haul networks**
- **Subject Matter Expertise covering all six M&S Communities**

The Future Army Training Concept Desires a Paradigm Shift From Simulations Interoperating to a Single Synthetic Environment

Challenges

- **Existing simulation systems are black boxes that interface externally allowing internal computations to be non-standard between model representations, introducing fair fight issues and additional inconsistencies**
- **A service-oriented concept or functional programming paradigm may introduce scalability disruptions as the scale and complexity of what is to be simulated is increased**
- **Current authoring approaches make simulation a specialized discipline vice being able to better incorporate model developers and domain experts input through easy to use interfaces in the creation of a simulation environment and execution**

Complementary Expertise / Facilities / Capabilities Sought in Collaboration

- **Computing architecture concepts and application to the M&S domain**
- **Computational expertise for exploring distributed computing concepts**
- **Methods to provide multi-resolution M&S to diverse user interfaces without introducing fair fight issues and other simulation inconsistencies**
- **Computing techniques relevant to real-time and non-real-time complex M&S**
- **Relevant non-military M&S expertise and simulation architecture concepts**